

**REMARKS/ARGUMENTS**

Re-examination and favorable reconsideration in light of the above amendments and the following comments are respectfully requested.

Claims 1 - 26 are pending in the application. Currently, claims 1 - 11 and 24 - 26 stand rejected and claims 12 - 23 stand withdrawn from consideration.

By the present amendment, claims 1, 4, 6, 10, and 24 were amended and claims 12 - 23 have been cancelled. Applicant hereby reserves the right to file a divisional patent application to claims 12 - 23.

In the office action mailed July 14, 2003, claims 1, 2, 5, 6, 24, and 26 stand rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 5,366,695 to Erickson in view of U.S. Patent No. 4,302,256 to Kenton; and claims 3, 4, 7 - 11 and 25 stand rejected under 35 U.S.C. 103(a) as being unpatentable over Erickson in view of Kenton and further in view of U.S. Patent No. 5,605,584 to DeLuca et al.

The foregoing rejections are traversed by the instant response.

Applicant's independent claims 1 and 4 have been amended to state that the claimed composition has "less than 5.0 wt% rhenium." Erickson discloses a composition containing about 5.0 to 7.0 wt% rhenium (see Abstract and claims 1 and 16) or about 5.5 to 6.5 wt% rhenium (see claims 12 and 28). Therefore, Applicant's claimed composition does not overlap the composition of Erickson.

Applicant's independent claims 6, 10, and 24 have been amended to claim an alloy or superalloy that is "capable of resisting initiation and subsequent propagation of fatigue cracks in a hydrogen environment." These amendments are

supported by Applicant's description at paragraphs [0023], [0024], [0020] and [0002], among other places. None of the alloys disclosed in Erickson, Kenton, or DeLuca '584 are capable of resisting both the initiation and subsequent propagation of fatigue cracks in a hydrogen environment, which is precisely what Applicant's alloys was designed to do. While DeLuca '584 discloses resisting the propagation of fatigue cracks once initiated, it does not disclose resisting the initiation of such cracks to begin with. Furthermore, the microstructure of DeLuca '584 comprises a trimodal  $\gamma'$  distribution, not a bimodal  $\gamma'$  distribution like that set forth in the claims.

In Applicant's alloys, the resistance to initiation and subsequent propagation of fatigue cracks in a hydrogen environment is accomplished by processing an alloy in a specific manner to create a desired microstructure therein. The mere fact that Erickson discloses treating an alloy to create a microstructure therein does not mean that the Erickson microstructure will perform in the same manner as Applicant's microstructure in a hydrogen environment. In fact, Applicant discovered the current invention because there was no suitable alloy already available that would meet the needs that Applicant's alloy meets.

Furthermore, the alloys of Erickson and Kenton were optimized for air breathing propulsion systems, not for liquid hydrogen fueled rocket propulsion systems like Applicant's alloy. In fact, there is not even any mention of hydrogen environments in either Erickson or Kenton. High pressure gaseous hydrogen has the effect of hardening the  $\gamma'$  precipitates in the alloy, causing them to resist atomic dislocation shearing, which results in strain localization in the thin layers of the soft gamma matrix phase in the alloy. This

results in preferential and dangerously rapid crack propagation in the gamma channels between the  $\gamma'$  strengthening precipitates in the alloy.

In Applicant's bimodal  $\gamma'$  structure alloys, when the process of allowing the large primary  $\gamma'$  octets to ripen is halted, the remaining liquidus phase is depleted of certain alloy constituents. Then, when the process of precipitating out the fine cuboidal  $\gamma'$  begins, the liquidus composition creates a softer precipitate that can be sheared. Thus, in Applicant's alloys, the normal fine  $\gamma'$  fracture mode is restored, and the preferential propagation of fatigue cracks through the soft channels of the gamma phase is avoided.

Based on the above arguments and amendments, Applicant respectfully submits that independent claims 1, 4, 6, 10 and 24 are patentable and distinguished from Erickson, Kenton, and DeLuca. As claims 2, 3, and 5 depend from claim, claims 7 -9 and 11 depend from claim 6, and claims 25 and 26 depend from claim 24, the discussion above applies to these claims as well. Further, these claims are allowable on their own accord. Thus, Applicant respectfully requests that the Examiner withdraw this rejection and allow pending claims 1 - 11 and 24 - 26.

The instant application is believed to be in condition for the foregoing reasons. Such allowance is respectfully solicited.

Should the Examiner believe an additional amendment is needed to place the case in condition for allowance, the Examiner is hereby invited to contact Applicant's attorney at the telephone number listed below.

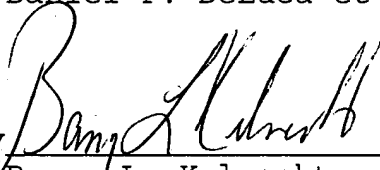
No fee is believed to be due as a result of this response. Should the Commissioner determine that an additional fee is due,

Appl. No. 09/943,150  
Amdt. dated April 16, 2004  
Reply to office action of July 14, 2003

he is hereby authorized to charge said fee to Deposit Account  
No. 21-0279.

Respectfully submitted,

Daniel P. DeLuca et al.

By   
Barry L. Kelmachter  
BACHMAN & LaPOINTE, P.C.  
Reg. No. 29,999  
Attorney for Applicants

Telephone: (203) 777-6628 ext. 112  
Telefax: (203) 865-0297  
Email: docket@bachlap.com

Date: April 16, 2004

I, Nicole Motzer, hereby certify that this correspondence is being deposited with the United States Postal Service with sufficient postage as first class mail in an envelope addressed to: "Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313" on April 16, 2004.

